

the spin current,⁵ and the explicit inclusion of $\Delta(1232)$ isobar-hole states.⁶ It appears that it may be possible to separate these mechanisms by studying the inelastic transition strengths as a function of single-particle occupation probability and as a function of angular momentum. The deformed nuclei in the s-d shell seem to be excellent candidates for such a study. The single-particle occupation probabilities as determined by single-nucleon transfer reactions change rapidly as the ground-state deformation changes. Also, several high-spin, 6^- , and low-spin, 1^+ , states are known from previous work.^{2,3,7}

We have measured the angular distributions and analyzing powers for polarized proton scattering from ^{26}Mg at 135 MeV incident energy. Angular distributions were measured in 5° steps from a laboratory angle of 10° to 60° for states in the excitation energy range from 0 to 20 MeV. Data analysis is currently under way. A preliminary analysis revealed at least five states which appeared to be 6^- states, based on their

angular distributions. At least one 1^+ state also appears evident.

With these data and the previously published data on ^{24}Mg and ^{28}Si ,² we will be able to study the systematics of the quenching of the spin-flip strength under controlled changes in nuclear structure. This should provide important insight into the underlying quenching mechanism.

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ENERGY DEPENDENCE OF PROTON INELASTIC SCATTERING BETWEEN 80 AND 180 MEV

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Measurements of the energy dependence of proton inelastic scattering are expected to provide a new means of testing predictions inherent in the microscopic distorted-wave impulse approximation (DWIA). In this description, the overall energy dependence for a particular transition arises from the individual energy dependences of 1) the underlying free nucleon-nucleon interaction, 2) the knockon exchange amplitude, and 3) the effects of distortion in the entrance and exit channels.

An investigation of the energy dependence of $^{28}\text{Si}(p,p')$ is in progress at IUCF, utilizing polarized proton beams at 80, 100 and 180 MeV, together with our earlier published results¹ at 135 MeV. Differential cross-section and analyzing-power data have been measured at each of these energies for the elastic scattering, as well as for many of the inelastic transitions. In particular, we have concentrated on the $5^-, T=0$ (9.70 MeV), $6^-, T=0$ (11.58 MeV) and $6^-, T=1$ (14.35 MeV) states, which are the dominant transitions

at large momentum transfer. The interest in these high-spin states arises both from their relatively simple structure and from the resulting excitation of these states by selected, non-central components of the effective interaction.

Cross sections at a momentum transfer of 300 MeV/c (near the peak of the angular distributions) are displayed (on a logarithmic scale) in Fig. 1 as a

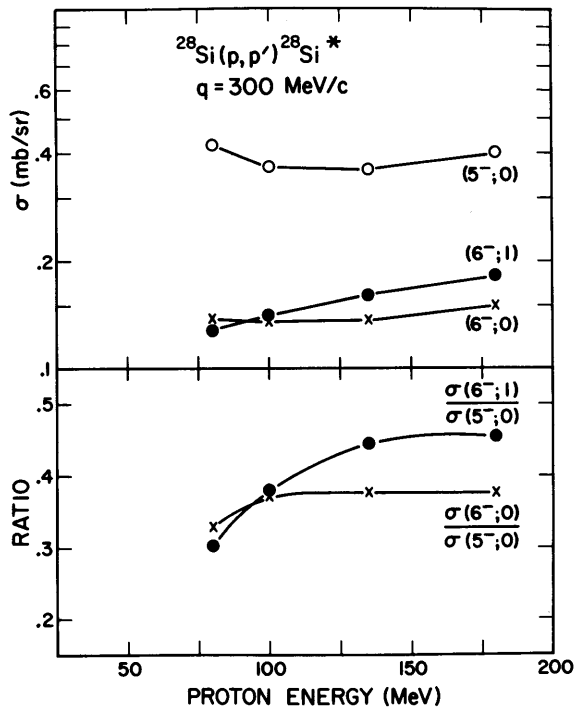


Figure 1. Energy dependence of the cross sections for the inelastic excitation of high-spin states in ^{28}Si .

function of bombarding energy. For the $6^-, T=1$ state, the peak cross section is observed to increase by a

factor of 1.48 over the energy range between 80 and 180 MeV, whereas the peak cross sections for both the $5^-, T=0$ and $6^-, T=0$ states exhibit a remarkably similar energy dependence.

Over this energy range, the components of the effective interaction that are responsible for the excitation of these states do not change as dramatically as the observed cross sections. DWIA analyses are in progress using the effective interaction derived at several incident energies² and optical model parameters that properly account for the energy dependence of the observed elastic scattering. Preliminary results of these analyses indicate that the effects of distortion are an important source of the energy dependence for the inelastic transitions.

The ratio of the peak cross section for the excitation of the $6^-, T=1$ state to that for the $5^-, T=0$ state is indicated (on a linear scale) at the bottom of Fig. 1. The significance of this ratio is that it removes much of the energy dependence that arises from distortion. It thereby allows an empirical observation of the enhanced excitation of high-spin, unnatural parity states relative to high-spin, natural parity states in the range of bombarding energies between 100 and 200 MeV.

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